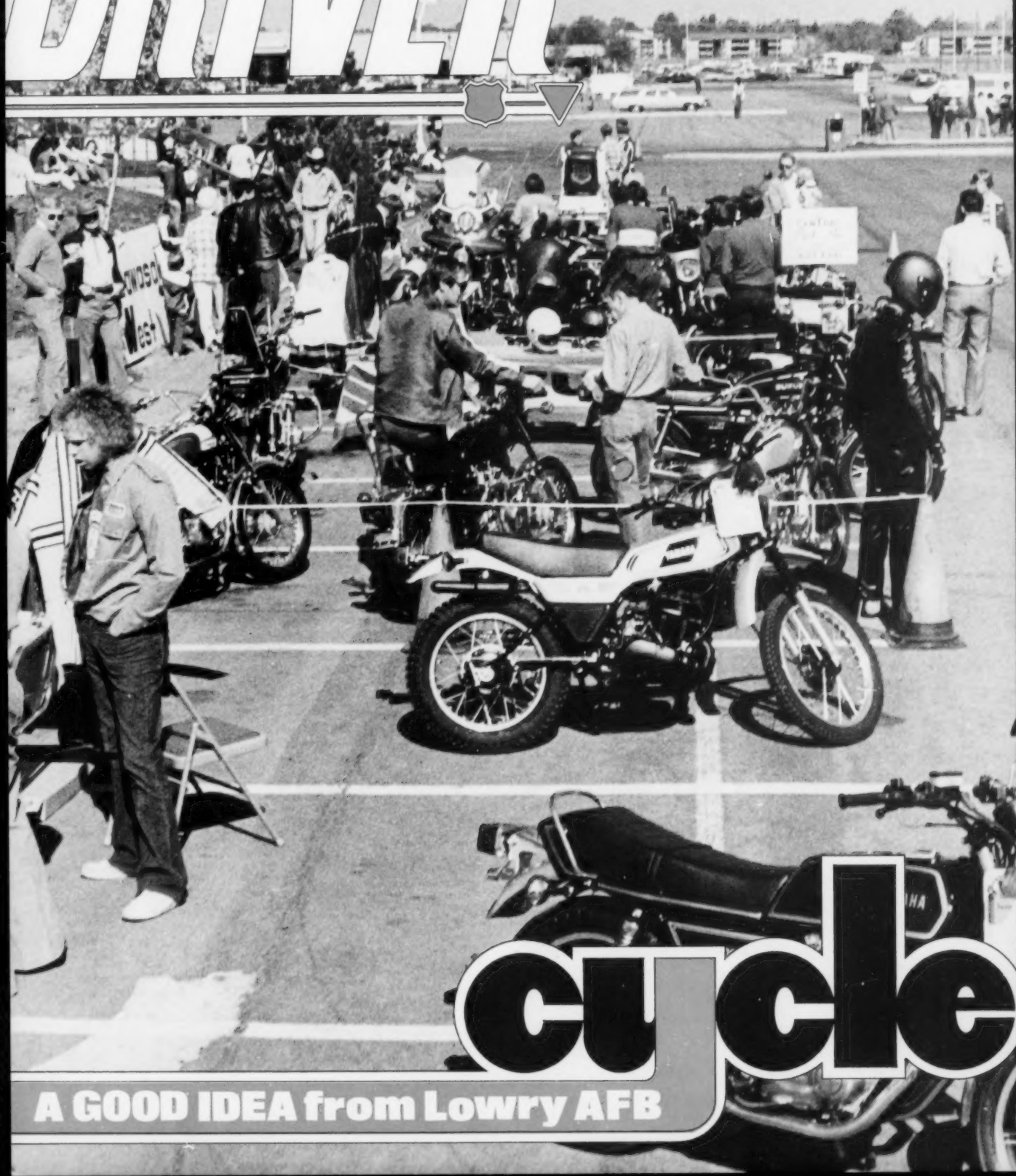
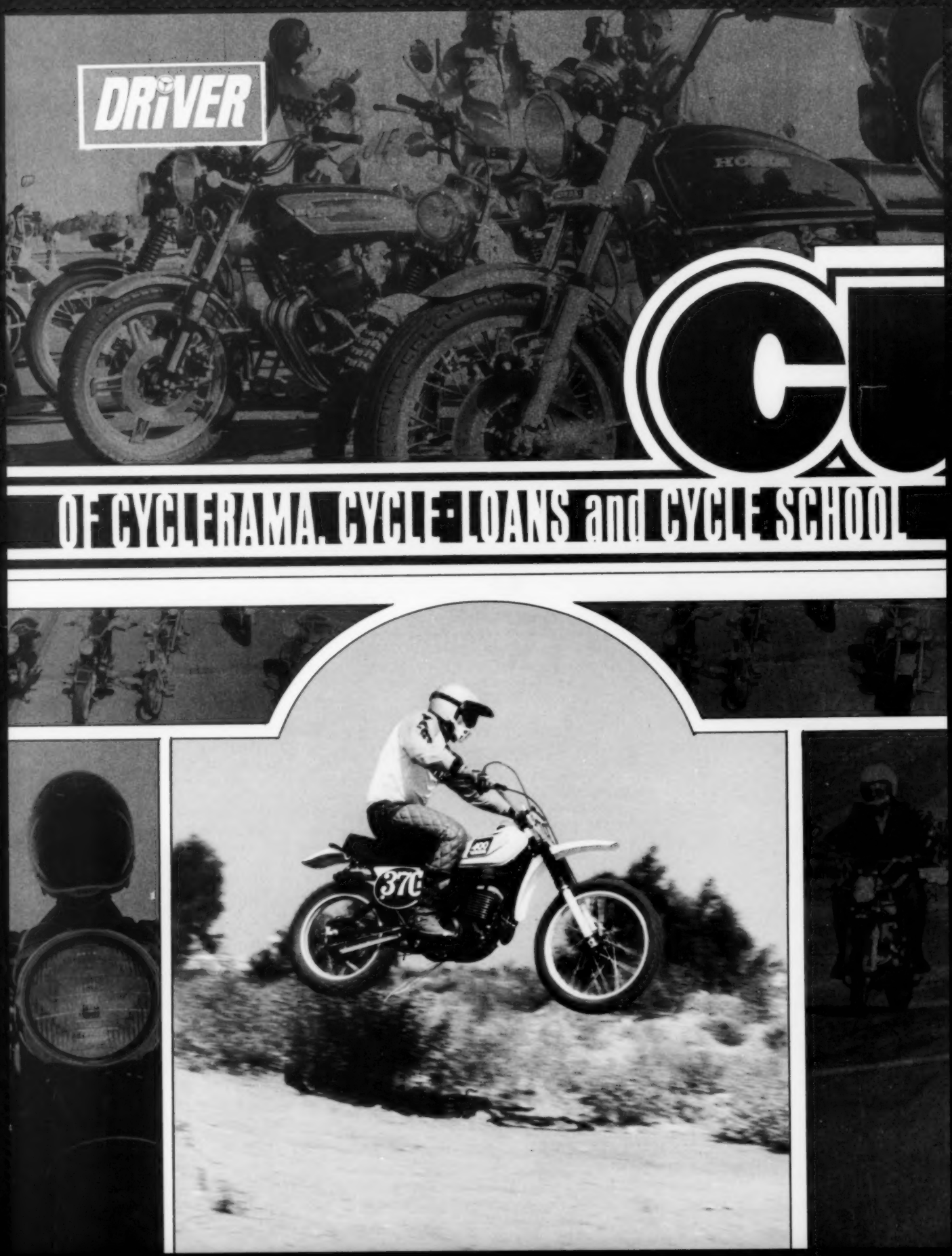
DRIVER

DECEMBER 1977



cycle

A GOOD IDEA from Lowry AFB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OF CYCLERAMA, CYCLE-LOANS and CYCLE SCHOOL
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Aurora, Colorado, Patrolman James Harr shows that even a big police cycle can perform tight turns.

Lowry AFB has begun an aggressive program to promote motorcycle safety. . . .

All right, hands, now. How many of you have seen a motorcycle rider dressed something like this: Safety helmet, cut-off jeans, sport shirt unbuttoned and flying in the wind, sandals? Yeah, most of you. Those who haven't probably haven't been paying attention. Just look around a little and you'll see one of these guys.

"So what?" you ask. "Can't a guy enjoy riding his bike?" To which we respond, "Sure, but it might be wise to think about your hide. That kind of riding is dangerous."

The rider in the cut-offs is right to think about his head, and the advantages of helmets. But a helmet alone won't keep you safe in an accident. Other items of safety equipment will go a long way toward saving your one and only bod. Gloves, boots, protective clothing, things like that.

Collisions with the pavement can be particularly nasty, and not just to the noggin. Ordinary clothes are rough, and they catch on cement and asphalt and you begin to roll, permitting your body to break into small pieces. So, our friend breaks a few major and minor bones, tears up a lot of exposed epidermis, and maybe gets bits of asphalt imbedded in his tail.

Contrast this with the properly outfitted chap in nice, slick leathers, who stands a good chance of just skidding a bit across the pavement and then getting up and walking away intact.

Which brings us to the reason for a one-day motorcycle show at Lowry AFB, Colorado, last October 15. Called "Cyclerama," it was a show developed by the Lowry Safety Office and the base credit union to promote the purchase and use of safety equipment, in the hope that lives – and hides – can be saved.

The Loan Arranger. Lowry's chief of Safety, Lt. Col. Richard D. Georgeson, came to the Lowry Federal Credit Union (LFCU) recently with a novel idea: Why didn't the credit union offer to finance personal protective equipment (PPE) along with loans for purchasing motorcycles?

The credit union said they were willing to do anything to help, and so they agreed.

continued

DRIVER

THE
TRAFFIC SAFETY MAGAZINE
FOR THE MILITARY DRIVER

DEPARTMENT OF THE AIR FORCE
HQ AIR FORCE INSPECTION AND SAFETY CENTER
Norton Air Force Base, California 92409

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Certain individuals shown in this magazine are not members of the Air Force and therefore do not conform to Air Force grooming standards.

DEC

VOLUME 11 NUMBER 7

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THE EDITOR SPEAKS DOUBLE CLUTCH

THE BACKYARD MECHANIC

Every once in a while our Technical Editor spends the day grumbling about the increasing complexity of automobiles. The last spell hit him just after he'd favored the editor with the repair of an electric door lock on her Chrysler—a little job that managed to require most of a Saturday morning instead of the programmed 45 minutes. Accessability problems, as usual.

"Better you had bought a nice used Ferrari," muttered the technical one as he finally buttoned up the tools and scurried off in his orange Bronco.

His distaste for the Chrysler actually started some months earlier, when the car first revealed its nasty habit of throwing off its drive belts. Not once or twice, but almost weekly. "Can't understand it," said the dealer. "Never saw a car throw belts like that."

"I understand it," says the Tech Ed. "Belts aren't supposed to have to turn corners to get around everything!"

Lately he's even been predicting the end of his famous DRIVER series, "The Backyard Mechanic," on the

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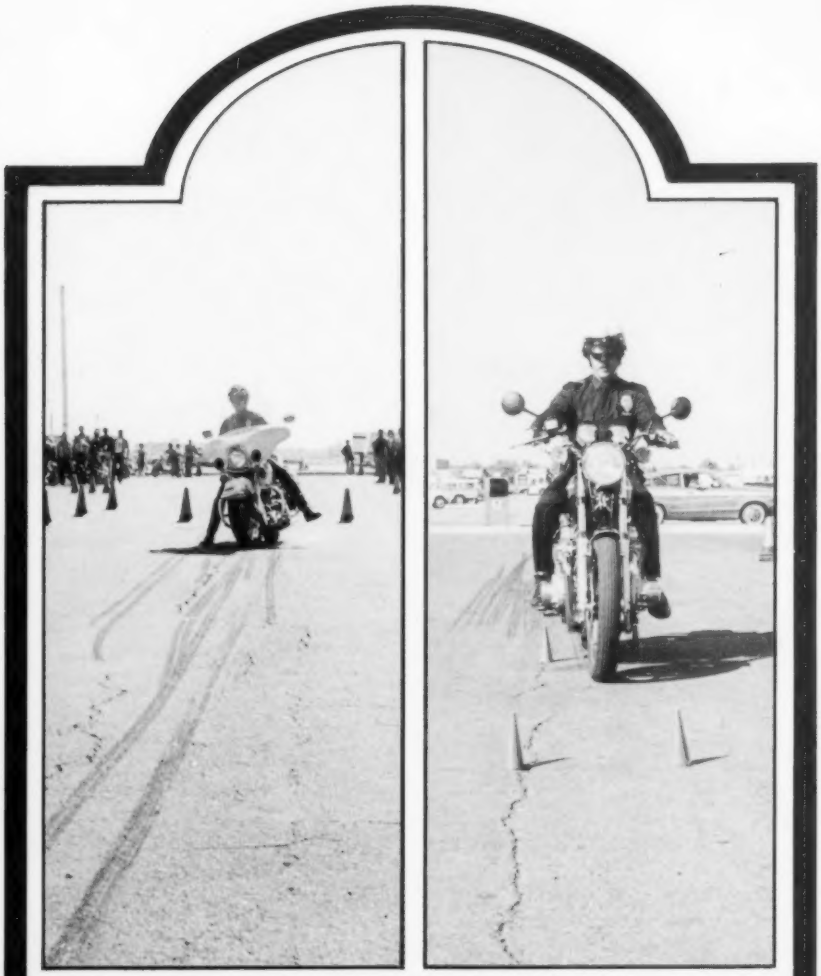


(left) An Aurora policeman smokes to a stop using both front and rear brakes. The long skid marks are from using only rear brakes. Convinced? **(right)** Patrolman Joseph Brauch concentrates as he navigates the "slow ride" on a borrowed motorcycle. Even for an experienced rider, it isn't easy.

The loans are for bodily protective gear, such as helmets, leather clothes, boots and gloves. When an airman comes in to borrow for buying a motorcycle, he is simply asked if he has the necessary protective equipment for safe riding.

Lowry's Cyclerama was the first large-scale effort to introduce the people stationed at the base, and their dependents, to the credit union's offer.

Held in the LFCU parking lot, the show featured displays of motorcycles and safety equipment by dealers from Aurora, Colorado, the city adjacent to the base. Seven different dealers attended. The 200 to 300 people who came downed 1000 free hot dogs and gallons of coffee provided by the credit union, and watched Lowry's Drum and Bugle Corps and Jody Drill Team.

The main portion of the show, however, was a motorcycle demonstration by members of the Aurora Police Department and airmen who have completed a special cycle-riding course given at Lowry.

Re-cycled Stunts. Two Aurora policemen were there to show the maneuverability of large bikes, and the things a skilled rider can do. Patrolmen James Harr and Joseph Brauch brought a Harley-Davidson 1200 and a Kawasaki 900 to the base to do stunts, turns and curves for the audience.

Commenting on a serpentine they put their cycles through, Patrolman Brauch said, "People tell us, 'Hey, I can't do that on my bike. The course is too narrow.' And then we show them it can be done on these big police bikes."

They also performed a series of panic stops to show the difference between using both front and rear brakes, and rear brakes only. Use of both brakes cut stopping distances by as much as two-thirds.

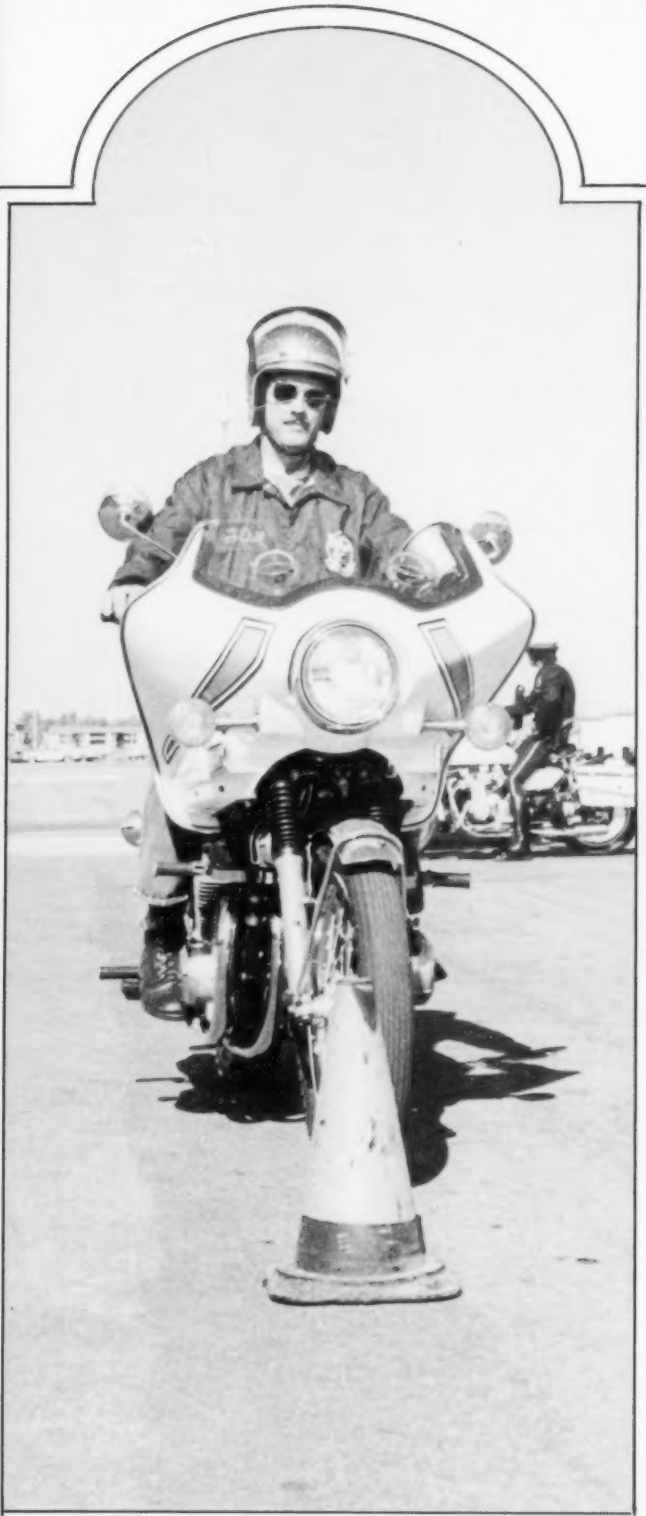
"Riders are afraid of their front brakes – they're afraid they'll flip the bike if they apply them too hard," Patrolman Harr said. "What they don't realize is that the rear brakes provide only 20% of the stopping power. The other 80% is in the front."

text continued on page 6
photos next 2 pages

(left)
Our friend here in the leather clothes shows what the well-dressed cycle rider wears, except for boots, which wouldn't fit on his wooden feet. His hero, The Fonz, doesn't really wear leather just because it's "cool." It's also safer.

(right)
A real-live cycle rider, dressed correctly, head to toe. Capt Ed Bowling of the Lowry Social Actions Office wants to keep his skin in one piece.

A motorcycle dealer demonstrates how a crash bar is attached to the bike. It performs the nice service of keeping your leg from being smashed if you end up under the bike after a spill.



TSgt Howard Jones, one of the Lowry people who attended the four-hour training session, performs a quick stop in front of a traffic cone.

Lt Col Richard D. Georgeson, center, and Brig Gen Andrew Pringle, Lowry's commander, chat with two motorcycle dealers. General Pringle praised the efforts of his safety office to promote safe cycling. "Motorcycles are a coming thing," he said, "so we want to do what we can."

Mouth guards, shin guards, face guards, there's something to protect all your valued body parts.

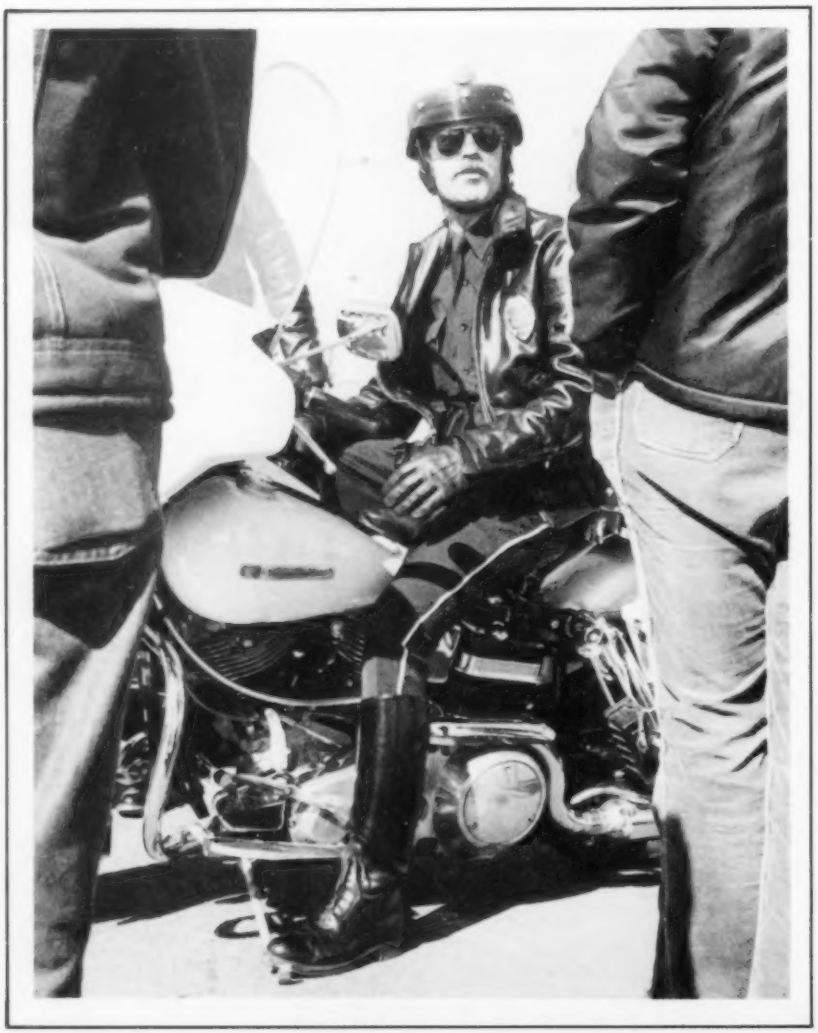
SSgt Larry Wrbas, instructor of Lowry's motorcycle course, attaches a face guard to his helmet.

The most difficult stunt was the one that looked the easiest – a "slow ride" down a straight course 1½ feet wide. Given a *minimum* of 14 seconds to do the course, with points taken off for deviations, stopping or putting their feet down, the men put their balance and clutch-handling to the test.

"The idea of this show was not to sell people on motorcycles," said Lt. Col. Georgeson. "They're already sold on them. The average airman now has the money to buy a motorcycle and the gasoline to put in it, and he'll do just that. The idea is to sell them on riding safely."

The safe, proficient cycle rider, like the safe, proficient automobile driver, has a better chance of avoiding accidents. Lt. Col. Georgeson said, "I feel we haven't stressed motorcycle safety enough in our programs. In 1964 there were about 980,000 motorcycles registered in the U.S. In '76 it was something like 5 to 6 million. We have between 400 and 600 here on Lowry."

He said there have been 12 motorcycle accidents involving Lowry people so far in 1977 – with two deaths. And although helmets are of course required on base, the State of Colorado recently repealed its helmet law.



The Aurora Police Department donated their time to help Lowry set up its motorcycle course, and members attend each weekly session.

Two-Wheeling School. With these things in mind, the Lowry Safety Office recently began a safety instruction program. In July, they sponsored a one-hour seminar with films on motorcycle safety. Lt. Col. Georgeson estimates over 400 personnel and dependents at Lowry attended the seminar's five sessions.

But the key to the entire program is a shortened version of a Motorcycle Safety Foundation (MSF) course that is offered to all interested cyclists at Lowry.

Although Lowry, like all bases, has the standard multi-media MM-12 course in motorcycles, the Safety Office felt it was not sufficient to fill their needs. So they recently sent a representative, SSgt Larry Wrbas (pronounced war-bus), to an MSF 58-hour motorcycle instructor course, held at Ellsworth AFB, S.D.

Upon completing the course, Wrbas arranged for Lowry to purchase a 22-hour MSF motorcycle rider's course for use at the base. The course included slides, films, books, and other instructional materials.

But the length of time needed to go through the course presented a problem. Twenty-two hours is a long time to take up from the basic training of an airman. And the course is designed to educate a brand-new rider, one who has never before ridden a motorcycle.

So, without access to bikes on which to teach new riders, the Safety Office had to alter the course. Aided by the Aurora Police Department, they "boiled down" the course into a four-hour, hands-on training session for relatively new riders with their own bikes. This supplements the MM-12.

Including both the basics of cycle riding and a quick overview of bike maintenance, the course is taught once a week, on Wednesdays, in a large open area on the south side of the base. Aurora motorcycle policemen come to each session, to show the same kind of riding that their men did at Cycle-rama. The students also get a chance to try it.

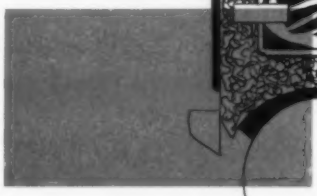
Each week, 12 bikers have gone through the course since the Safety Office started it in August. Lt. Col. Georgeson hopes to be able to offer the entire 22 hours at some time in the future.

Although the course is aimed at the relative novice, even experienced riders have benefited. AB Laszlo Budavari, a cycle rider for six years, said, "I didn't think there was a lot I could learn, but I took it anyway, and I was surprised. I learned a lot about the proper way to make turns."

With their push for PPE loans and the rider instruction program, Lowry is demonstrating its concern for a growing segment of the population – those who have taken to two-wheeling for fun or for economy. This kind of concern is something DRIVER would like to see at other installations. We realize this sounds like a commercial, but sometimes we have no subtlety at all.

Lt Col Richard D. Georgeson, Chief of Safety at Lowry, served as the host for the Cyclerama show.

The Lowry Federal Credit Union roped off its parking lot to hold the Cyclerama show. Seven motorcycle dealers set up displays.



Webster's New Collegiate Dictionary defines addicted as: "To devote or surrender oneself to something habitually or obsessively." I am addicted.

Before I hear from the OSI, let me explain that there are no track marks on my arms. I am addicted to a two-tone brown, 1977, short-wheel base, Chevy ½-ton van. The fourth love of my life (wife, son, and flying get top billing).

And I am not alone, not by a long shot. Every Air Force Unit has its own van enthusiast, or maybe several. This article, you van nuts, is not dedicated to you.

As a fanatic, like most fanatics, I am seeking recruits. My targets are those borderline cases who have thought about joining the van clan but have not yet jumped. I know there are a lot of you out there and that you cover the full spectrum of rank and grade. You all are about to be exposed to vans—purchasing and customizing, according to DRIVER.

I will not spend a lot of time proclaiming the virtues of vanning. The reasons one purchases a van are as different as are van owners. I couldn't possibly cover them all. So I am going to assume that your reason for and interest in buying a van has won over your hesitation. That's where we'll begin and I'll try to help you make decisions along the way.

Makes and Models: Vans come in all sizes, shapes, colors. Chevy vans, Dodge vans, Ford vans, GMC vans, short-wheel bases, long-wheel bases, vans with windows, closed vans; the list goes on and on. When choosing, try a scientific approach. Ask yourself, "Why do I want this van? What do I plan to do with it?" If you just want more room for the wife and kids, think about a window van. If you are planning to customize, a closed van with rear windows may be best.

At this point visit the new car dealerships and pick up brochures on the types of vans sold by each company. Locate some van owners (there are plenty around) and discuss the relative merits of one make or model versus the others. Based on your needs and desires, pick the make that most appeals to you and the model that best fits your requirements.

Okay, if you decide to buy a certain-make van which does not require any further work, such as a fully-customized closed van or fully-stocked window van, your job is easy. Decide whether you want to buy new or used, then hit the dealers or the newspapers until you find what you want, at a fair price. The best time of year to shop is during the winter months. Van sales go way down then and, since prospective buyers are scarce, car dealers and private owners are more willing to negotiate. Eventually you will find the vehicle that fulfills your wildest VANtacies (sorry about that).

The remainder of this article is focused on those persons who feel the urge to both build to their expressed needs and to fulfill their creative desires. He or she buys a basic, stripped-down van and starts from scratch.

Buying the Van: Whether you opt for a brand spanking new one or a used model, remember you don't want a vehicle that drives like a truck. The desired end result is a comfortable machine. Decide on the options that you feel are essential, and bypass those you can do yourself at a lower cost.

No customized van is complete without chrome bumpers, chrome mirrors, and a chrome grille. If buying a new van, getting them now may be a lot cheaper than going out and purchasing them later. Most vanners also feel that power steering and power brakes are a must. These will increase the resale value of the vehicle and make driving it much more pleasurable.

When buying new, stay away from radio and dome light options. Radios can be purchased for one-half the dealer price and are easily installed. Stock dome lights are normally discarded while customizing the interior.

Air conditioning should also be considered, especially in the hotter climates. Keep in mind that factory air (that installed during production) is usually quite a bit more expensive than the add-on units available. These add-ons have vents that fit perfectly into the dash and the only difference between them and factory air is in the placement of the control box. If you are planning to add air conditioning, you may want to get the heavy-duty suspension and cooling packages.

New van buyers should also stay away from dealer installed custom wheels for they are much cheaper elsewhere. However, the additional expense for radial tires now is less than what early replacement of stock tires will cost. Radials last longer and they substantially improve the handling characteristics of the van.

High-back seats are another consideration. If you are planning on plush, swivelling, front captain's chairs, wait

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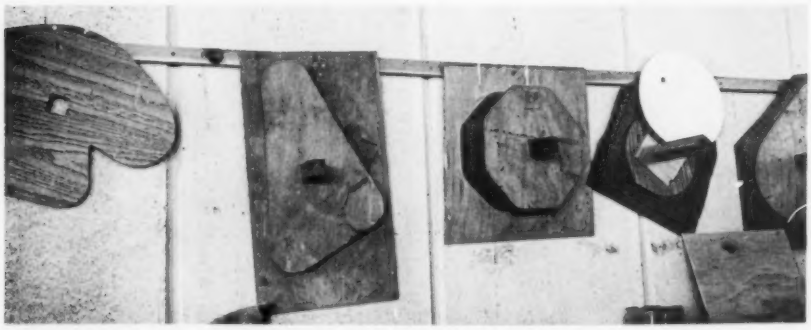
Plastic

by Capt JAMES J. LAWRENCE



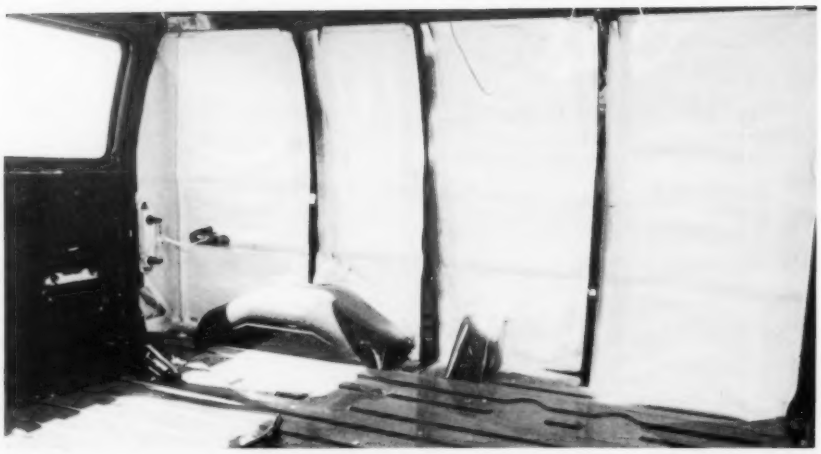
Templates are a necessity for successful porthole, vent, or sunroof installation. They can be constructed from wood or sturdy cardboard.

Portholes come in two pieces. The outside half is connected to the inside half by screws, with the exterior and interior wall between the two sections.

Hand-painted murals offer a limitless variety to choose from. This van is to be used for Navy recruiting.

(right)
The van is much easier to work on if you completely strip the interior prior to starting conversion.

Van Conversion Kits come with precut panels designed specifically for your make and model van.



Blown fiberglass has a better insulation rating than the standard home-type fiberglass sheeting.

After the porthole or window template is traced onto the exterior wall, a two-inch strip of tape should be applied around the tracing to prevent scratches while cutting the opening.

Chrome luggage racks and ladders are functional and they add to the exterior appearance of the van. Installation is one of the easier jobs you will face.

Mag wheels are attractive and a wide variety of styles is available.

(left)
A window Van (top) may be just what the family seeking more room needs. **The closed van** (bottom) is the starting point for most van conversions. This model is one of the short-wheel-base variety.

and get them later. If you want just stock, high-back seats, it's cheaper to pay a little extra now.

Don't spring for portholes, vents, sun roofs, or luggage racks now. Those are less expensive at a van accessories shop and your own labor will save you a bundle when you begin your customizing work.

Customizing Your Van: You have brought your van. As you sit in the front seat and look back, what do you see? Nothing but bare metal and a spare tire. The task ahead of you is to turn this truck into a pleasurable, comfortable, home away from home. Unless you are a van converter by trade, the first step is to get a book on van customizing. These books not only teach you, step-by-step, how to do it, but they serve as excellent sources for helping you to decide among the options available to you.

This leads us to the most important aspect of a van conversion—PLANNING. Before the first hole is drilled, you should have decided exactly what you want and where it goes. This will save you hours of frustration and wasted time down the line. Get some van magazines, visit some van shows, talk to the van accessory store people. Find out what things cost and where other people have put them. Then try sketching-out the interior of your van from different angles. Elaborate detail or artwork is not necessary. The purpose is to decide what will fit where, and whether or not you will like it there.

When you have planned out exactly what you want, you now have three basic options. The first is to give up and take your van to a customizer, show him your plans, and pay for his expertise and talent. The second is to purchase a van conversion kit, which can come complete with fitted wood panels of various materials, floor coverings, door panels, etc.; most everything you might need. The last option is to do it yourself, preferably with a set of van conversion plans.

Van customizers produce the best results, take the least amount of time, and guarantee their work. The drawback—it's darn expensive. Total cost for the van plus the conversion, although high, is still somewhat less than the cost of a customized van bought direct from the dealer. Workmanship can be equally as good. But beware. The van craze has resulted in a lot of less-than-professional people entering the field. Shop around and get estimates in writing. Check out their work before buying and ask for a list of past customers. Call these buyers and see if they were satisfied with the quality of the work performed.

The market for the van conversion kits is filled with companies who all claim to be specialists. The costs for these kits will vary drastically depending on the type of material offered and actual number of panels in the kit. Some come with floor boarding and rugs, while others don't. The front compartment panels may or may not be included in the kit. Don't buy impulsively because of price and don't buy sight-unseen. Also, don't be lulled into a feeling that these kits are all-inclusive and require little work. All they consist of is the outer wall-covering panels. All the preparatory work, that I will explain in a moment, must be completed by you.

To do it yourself, without plans or blueprints, requires carpentry skills beyond those possessed by the average person. Customizing shops are filled with half-finished jobs by people who thought they could work it out on their own. Remember, a van is not a perfect square shape with straight lines. The outer walls and internal braces are curved with the van—widest halfway between roof and floor. Joints and corners are difficult to finish properly, and door panels require expert fitting. My recommendation is to buy a set of conversion plans (average cost approximately $25). With the help of your customizing book and the plan's instructions, successful conversion is well within the ability of the average person.

Preparing the Interior: Remove the spare tire and all clamps, braces, holders, and lights. It will also help to take out the front seats and remove all door and window handles. Run the wires for any light fixtures planned and any stereo speakers desired now. Tape them down and leave the ends hanging where these accessories are to be located. The next step is the flooring. Most vanners use ½- or ⅝-inch plywood or particle board. Two 4x8-foot sheets should be enough to do the job for any van.

The van cab is merely thin sheet metal spot-welded to reinforced steel braces. Inside noise is greatly amplified and you have a heck of a time heating or cooling that large an area. For these reasons, insulation is mandatory. Three basic types are available. These are regular housing fiberglass insulation, blown fiberglass, and foam sheeting.

If you opt for the regular fiberglass sheeting, get the 4½-inch-thick variety. This method is the least expensive way to go but the drawback is that this fiberglass stripping is a bear to work with. Get yourself some thin, flexible gloves and wear a long-sleeved shirt and long pants. I've found this type of insulation to be most irritating when it touches the skin. A good contact cement will hold it to the van wall and be sure to mount it with the shiny side facing the interior of the van.

Blown fiberglass is a bit more expensive, yet easier to work with. The machinery can be rented or you can have a professional do the job. Its effectiveness rating is better than that of regular fiberglass insulation.

The last option is the use of foam stripping. The cost is the highest and installation requires a good deal of cutting and trimming. Foam is also secured to the wall using contact cement and it has the highest insulation efficiency rating of the three methods.

The Interior: Since a van's interior is quite curved and since there are few supports for securing the interior paneling, a frame of some sort must be built. Van conversion plans have templates—cutouts used to trace the size and shape of a desired panel or brace onto the materials to be used—which will aid you in building corner supports. A frame of wood furring strips is then erected using the details in the plans.

Before erecting this frame, however, a decision must be made. Are you going to install porthole windows, a sun roof, or roof vents? If the answer is "yes," remove any metal frame ribs which will interfere before constructing the frame. (They are only spot-welded and not that difficult to remove.) Then build your frame so that access to these planned additions is not inhibited.

Before you know it, a frame is built and all your preparations are completed. Now if you decided on a van conversion kit, the panels are then secured to the furring strips. A good deal of trimming is often required but the basic panel shape is there. The more daring, who decided on the van conversion plans, must make these panels themselves.

The first step for this latter group is to pick your materials. In the planning stage you should have considered whether you desired an all wood interior, an all rug interior, vinyl, material or combinations thereof. Your choice will direct you to the type of paneling to go with. If the walls will be covered, go

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with the cheapest paneling or masonite you can find. If they are to be bare exposed wood, consider a better grade which will wear well. Shop around for sales and don't eliminate the possibility of using a combination of different panelings or materials.

The do-it-yourselfer will have to buy from 4 to 7 sheets depending on the size of the van. The conversion plans will give you the exact number. Templates must then be used to outline the size and shape of the desired panels. Cut these out and expect some final trimming during installation. Don't try to construct on a piecemeal basis. Cut out all required panels first and then think about piecing the puzzle together.

With a lot of hard work, frustration and aggravation, your basic interior is complete. At this point, you have finally reached the stage where there is visible reinforcement for all the work you have invested. This will either encourage you to go on or forever turn you off to vans. Remember, now you have only your basic interior. From this point, interior decorating as to seating, beds, cabinets and partitions still has to be completed, but the variations possible are too numerous to cover here. Your initial plan and the "how-to-do-it" book will offer recommendations on achieving the finished product.

The Exterior: Now that you are satisfied with the inside where you spend your time, you are ready to make the van more pleasing to the outside observer's eye. The first step should be to install any portholes, roof vents, windows, sun roofs you planned on having.

Installation of these accessories is easier than you think. The biggest step is building up the courage it takes to make that initial cut in this van which you have worked on so hard. Specifics are detailed in the instructions that accompanied these accessories, but I will cover some helpful hints. These hints apply to all types of windows and vents.

The cut into the van itself is not difficult. A jigsaw or sabre-saw with a sheet metal blade works just fine. Trace a template of your window onto cardboard or wood and cut it out. Then fit your window into the hole you just cut. If the fit is snug but not tight, your template (the cutout removed) is useable. If the fit is very tight or much too loose, try the procedure again until you get a functional template.

Trace your window or vent outline on the interior wall. Then surround the outline with 2-inch masking tape. This will prevent the saw from scratching your paint job. Next drill two holes running through the template held against the van's surface, through the van wall, the insulation, and the interior paneling (a long bit is necessary). Remove the template and insert long screws through these holes. Go back inside the van and place your template onto these screws and trace the outline on your interior wall. This exercise will insure wall alignment for installing this accessory.

Drill a hole inside the exterior outline drawn. Make it big enough to accommodate the sheetmetal blade and

A basic carpet and paneling conversion in progress.

Interior decorating options are endless. This conversion includes an ice box and a propane stove.

Hi-back swivel captain's chairs are both comfortable and attractive. They come in many styles and colors to match any interior plan.

DRIVER wishes to thank the following California auto dealerships for allowing us to photograph their customized vans.

Don Snavely Inc. Dodge, Redlands

Lange and Runkel Inc. Chevrolet, Redlands

Van Wyk Volkswagen, San Bernardino

All photographs of van conversions in progress were taken at Sundial Camper of Edgemont, Calif. We wish especially to acknowledge the gracious assistance of Patsy Stanley of Sundial who is featured in several of these photos.

Decals or hand-painted trimming livens up the exterior of a van. Decals, however, tend to peel or chip with time.

This van interior is stylish yet still practical for camping and travel.

then cut away. Come inside and do the same thing for the interior outline, using the appropriate wood-cutting blades. The openings should match up perfectly (we hope). Now all that's left to do is peel out any left-over insulation and install the accessory.

First, however, place support blocks between the exterior wall and the interior wall, the same size as the space between them. This will prevent the window or vent from squeezing the walls together and perhaps buckling the exterior or interior surfaces.

These accessories do not attach to the van, rather they come in two pieces and the outside half screws onto the inside half, with the exterior and interior walls between them. One last thing: Use a good grade of silicone glue or caulking tape between the accessories' outer half and the exterior wall. This procedure will prevent water leakage inside. Tighten connecting screws evenly and trim off the excess silicone or caulking. There you are, a job as good as any professional could do.

Next comes roof racks and/or ladders. These are easy to install, but be careful that the sheetmetal screws you use to secure them are not long enough to penetrate the interior walls.

If you haven't done so thus far, now is the time to think about fancy mag wheels. These wheels really add to the appearance of a custom van but unfortunately, they are very expensive. Decide on the ones you want, but then look for a discount outlet or a catalog company that carries your selected brand and design. These sources have prices which normally are much cheaper than the prices in the average retail outlet.

The last major finishing touch is what to do with the exterior walls. The choices here are endless, from leaving them the way they are to detailed, hand-painted murals. In between are painted designs, edgings, and pinstriping. Decals are available and are much less expensive than real paint. They look as good; however, expect chipping or peeling sometime down-stream. Continue your practice of shopping around and examine an artist's work before purchasing.

Other options available are accessories like driving lights, fender flares, and rear window scene inserts. The list goes on and on and new products come out every week to tempt the truly addicted vanner.

I made it all sound pretty easy, didn't I? Well, in actuality it isn't that easy. I recently completed customizing my 1977 Chevy van and after three months of sporadic evening and weekend sessions, I finally got it into what I considered to be respectable shape. As an old, married guy with a kid, I selected a van conversion that is less showy than it is practical and suitable for camping. The beauty of vans is that the range of options is so vast it's possible to please anyone's personal tastes.

We recently completed a trek from East Coast to West Coast with a good deal of sightseeing and tourism in between. The comfort, handling characteristics, and performance of the van have made me a true believer.

That's my sales pitch. This article in no way attempts to tell all about how to customize the van. I just tried to give you some helpful hints along the way and show you that even a 10-thumbed novice like me can succeed in this task. The secrets to success are planning and possessing a real desire to express yourself creatively. There is no right way or wrong way. Layouts, materials, and style are all dependent on your personal preferences and needs. The result can be a pleasure vehicle that is comfortable, practical and a source of pride.

The finished product. A comfortable vehicle an owner can be truly proud of.

"Walkin' In A Winter Wonderland" makes a great song title . . . but it's a lousy survival technique

You think you can't get snowbound in a short period of time, huh? These cars were trapped in a city with snow removal equipment operating at the time. Snow fell for only eight hours to accomplish the stranding. Most unpleasant if it were to occur out in the woods . . . with you in the middle of it! And it has been fatal even in towns.

Walk in the snow

Those of you stationed in the colder parts of the country have no doubt about the misery, suffering, and even death that winter can dish out. The winter of '76-77 will be long remembered, not as a scene out of Currier & Ives but as one hard, frigid, devastating season that made us remember that winters are not all skiing, skating and fun. We hope the following will help to make you aware that winter driving can be not only a matter of accident avoidance but of survival.

The Basics. In the past, our annual Winter Driving edition (November) has given you car prep tips, tips on how to drive on snow and ice, and info on what survival equipment to carry. This year, we'd like to take this one step further and give you the dope on what it may take to survive a winter stranding.

Aircrews have long been aware of the possibilities of bailing out over some frozen, inhospitable bit of tundra. They are prepared for it, both physically and emotionally, and have the training and usually the equipment to cope with even the worst of conditions. But how about YOU? "Never happen," you say? "I don't fly and I never get off plowed roads when I go to my favorite ski lodge."

Have you ever considered what would happen to you if, by some chance, you were forced off the road by another car just before the road was closed by heavy snow? There you are, off the road in a small ditch, with your car stuck up to the doors in snow, and your destination over 10 miles away. The road has been closed, so there's no traffic to spot you or assist you, and you know that only if you're VERY lucky will the hotel clerk suspect there's something wrong when you don't show up to claim your room reservation.

The above premise is not very far-fetched at all, and some of the other reasons people get stranded in snow are about as innocent, too. What if you take the family up to the high country for an afternoon picnic during "Indian Summer?" About two o'clock you notice the clouds beginning to roll in and light snow starting to fall . . . about the same time you remember that you're 20 miles from the main highway. As you skid off the road because of a light dusting of snow, it begins to snow harder . . . much harder. . . .

You can probably think of a dozen other causes for spending a night or two out in the cold n' snowy . . . what we'll tell you here is how to survive that time spent in the great outdoors.

In the November issue, we've included a list of things to carry in your trunk in order to make your winter driving safer. Now let's look at a list of things that may make the difference between survival and death in a winter stranding situation.

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Minimum Winter Survival Kit:

- Blanket(s) and/or heavy overcoats
- overshoes with high tops
- gloves or mittens
- several pairs of wool socks
- candy and condensed/freeze-dried foods
- candles and waterproof matches

This whole kit takes up little space in a trunk or corner of the back seat. Additional items to consider would be: winter survival manual, hatchet, tent or shelter half, portable radio tuned to the weather band, signaling mirror or hand-held mini-foghorn, and, if you have no moral aversion and local law permits, a small-caliber handgun . . . but only if you are properly trained in its use.

Stay With the Car. All the survival manuals ever written say to stay with the vehicle that got you there in the first place. If your boat tips over, stay with the boat. If your plane crashes, stay near the wreckage. If you're stranded with your car, stay with it. Eventually help will come. Your car (or truck, or camper) provides you with shelter, signalling devices, eating and cooking utensils, etc., but most importantly, it provides the starting point for most search-and-rescue missions. If you stay with the vehicle, the "search" portion of the mission may be shortened.

Don't wander too far from your car or shelter if snow is falling or the wind is blowing. Those stories you've read about farmers getting lost between their house and their barn because they couldn't see through the blizzard are *true*. Be patient. Eventually it will stop.

Strong winds coupled with freezing temperatures force you to take steps to insure that your car will be a suitable shelter. We want to emphasize that people who are stranded die because of two things: the cold or carbon monoxide poisoning. So the car that can protect you at least somewhat from the cold can also be your undoing if you don't have proper ventilation.

If you are wearing good, water-tight, insulated boots, go outside the car to make sure that there is no fuel leaking from the vehicle, and that the exhaust system is intact. If the exhaust pipes are OK, clear away any snow or obstructions from the tailpipe and provide a clear escape path for exhaust gasses. If there are fuel leaks, you must do one of two things: Either stop the leak, so you can safely run the engine for heat, or attempt to collect the fuel (using a hubcap, thermos, even a rag) so that it can be used later as a source of heat or as a signal to rescuers.

So it's a nice winter day and you're just cruisin' along on your way to cut down a Christmas tree . . .

And then, all of a sudden, you see a sign like this. Maybe someone is trying to tell you something. Unless your destination is in sight or your mission very important, perhaps you should consider turning around.

Again, if you have adequate footwear, you may want to gather some evergreen boughs to use on the seats as bedding. This isn't really necessary though, and you run the risk of separating yourself from the car and/or injuring yourself by tripping, falling, etc.

If the temperature is so low you feel you must run the engine to get heat, remember: The UPWIND window must be open to assure adequate ventilation and to prevent carbon monoxide poisoning, and the area around the grille and radiator assembly must be clear so that air can flow. If cooling air isn't available for the engine, it will overheat rapidly.

If you're not running the engine, close the windows tightly. Your body heat and the absence of a wind chill factor will keep the temperature inside the car at a survivable level in many cases. If your windows were broken when you got stuck, use anything you have to close the hole. If you cannot close off the majority of the air flow, you may be better off to seek shelter elsewhere.

Your car can provide many things in the way of survival tools. Gasoline or oil can be put in a hubcap and carefully ignited with a long stick. This will provide black smoke to use as a signal, heat for warmth, and, used with a second hubcap, a stove for the melting of snow for water.

The spare tire, removed from the car, deflated, and set afire provides dense, black smoke for signalling, and some heat for comfort.

Hubcaps make good pots and pans, plates, shovels, noise makers, toilets, reflectors, and stoves.

Broken mirrors can be used as signalling devices, knives, and fire-starting devices.

The hood or trunk can form part of

(left) All of a sudden, it's slip 'n slide time . . . and here you are! Face it folks, this guy is in deep snow. It *can* happen to you! Read the article to see how your car can be of as much help in getting you out of a tight situation as it was getting you into it. **(right)** There are times when your vehicle will not provide you with a suitable shelter . . . this is one of those times.

a shelter, or be used as a big frying pan (if you have anything to cook), a signal (both visual and audible), and as a travois or sled to carry injured people or firewood.

Wires ripped from underneath the hood or dash after your battery is dead can be used for ropes to form snares or for pulling the hood. They can also be used to tie things together for a wind-resistant shelter.

If you must abandon the car, the seats can be of help to keep you off the ground in a snow shelter.

Chrome parts can be signalling devices. The interior panels, carpeting and headliner can be burned for warmth as well as for smoke signals. Do not burn these in a confined area though, because they can generate poisonous gasses during combustion. They can also form shelter walls or floors. Don't forget the floor mat in the trunk.

If you expect you may spend several nights in the car, be aware of the problems of condensation and frost. During the night, moisture from breathing accumulates and forms frost. During the day, the frost melts and drips over clothing, food, etc., stored in the car. During the next night, the cycle is repeated, and eventually solid layers of ice may form and make item separation difficult if not impossible.

Also, you may want to consider moving your first-aid kit into the passenger section with you instead of keeping it in the trunk. It will be easier to get to, and some of the medicines may be adversely affected by freezing temperatures.

First Aid. A first-aid manual could turn out to be one of your most valuable assets. Many states issue survival and first-aid booklets outlining procedures that may be peculiar to their particular areas.

The basics for first aid in a cold weather survival situation are:

- Keep injured persons warm and dry. Put victim in a sleeping bag, provide shelter if possible.
- Warm food and liquids are preferable for conscious victims.
- Avoid alcohol.
- Improvise heat packs by wrapping hot stones, sand, metal, etc., in fabric, but insure that victim is not burned. Place hot packs at the small of the back, between thighs, under armpits, on stomach, or on soles of feet.

Frostbite will probably be one of your biggest worries. Frostbite is the actual freezing of some part of the body. As a rule, the first sensation of frostbite is numbness rather than pain. You can see the effects of frostbite as a grayish or yellow-white spot on the skin, so keep an eye on the members of the group as protection for each other.

Get the frostbite victim into a heated shelter as soon as possible. When only the surface skin is frozen, it becomes spongy to the touch, and can be rewarmed by body heat. Place a warm hand or palm against the skin until thawing is accomplished.

If the freezing is deeper, thawing must take place quickly and is best accomplished by using warm water. Do not allow the area to refreeze, because this will usually result in loss of tissue. If

continued

In this case, the use of the car as a shelter is questionable. The car isn't on level ground and could slip further down the canyon. However, all the windows and doors are in fact and it would be easier to use the car than to build a shelter out of the stubby native scrub. You should brush the snow off the side, though, so the car is more visible to searchers.

warm water (105° to 110° F) is not available, thaw the frozen part with heat packs placed inside clothing.

If frostbite is accompanied by breaks in the skin, apply a sterile dressing, but do not use any ointment.

Never forcibly remove frozen shoes or mittens . . . place them in warm water until soft, and then remove gently.

Snowblindness, headaches from enclosed fires, weakness from lack of food, and chapped skin are all things that you must be aware of, too, and since our space is limited, we suggest you read up on these subjects in a good survival manual.

Those of you who are smokers may find that smoking has both good and bad effects in a survival situation. Good, in that smoking can sometimes alleviate the feeling of hunger and can provide an easing of tension. Bad in that, since your desire for food may be lessened, you may not eat enough to keep up your strength. Whether or not you smoke is up to you, but if you have matches instead of a full lighter, we suggest you save the matches for fires. (Medical doctors do not approve of smoking at all under these conditions because smoking causes peripheral vaso constriction and can make one more susceptible to frostbite.)

Water. So you're stuck in the snowdrift, with snow and ice up to your . . . ears, and you need a drink of water? "No problem," you say? "Just eat some snow!" WRONG! Eating snow or sucking ice will not really alleviate your thirst, and it *could* lower your body core temperature to a dangerous level. Start a fire and melt ice or snow, let the sun melt it, put some ice in a rag and keep it next to your body and then suck on the rag . . . anything but eating it directly. Dent the roof of your car and place some ice in the dent . . . the sun will melt it . . . the same goes for a dark-colored tarpaulin. Don't worry about sterilizing melted snow or ice, or about its purity . . . it'll be OK if you use a little common sense in collecting it. Eat snow or ice only as an absolute last resort.

Signaling. We've mentioned using the shiny parts of your car to create mirrors, and lighting fires to get smoke, but there are some things to remember about each method:

■ If you don't have a custom-made signaling mirror, try poking a hole in a can lid or flat, shiny thing with a screwdriver or nail. Sight through the hole and aim at a tree until you learn what angle it takes to hit your target with the reflection. When rescue planes are spotted, aim the mirror as you have pre-determined and flash it up and down.

■ Many people don't realize that only in rare instances will smoke from a signal fire go straight up. More often than not, it will go up about 150 feet and then disperse, or it will hang around in the treetop air currents. If you are using smoke, it's best to use it in a clear area where the color of the smoke will contrast with the surroundings.

■ One of the best signaling methods is to use a large, brightly-colored object (like your car's hood) placed in an open area. Sea-marker dye (which of course you don't have) or brightly-colored rain gear work well, too. If you don't have anything, at least get into an open area and tramp out a large triangle or a series of long straight lines . . . since a straight line rarely occurs in nature, these are more easily noticed by search plane pilots.

Attitude and Morale. Don't confuse our heading of "attitude and morale" with the "gimme 50 pushups" school . . . without the proper attitude and good morale, your task of survival becomes doubly difficult. When you stop trying to survive, it may naturally follow as a self-fulfilling prophecy that you will fail to survive.

Normally, the most depressing influence on you (in a winter survival situation) will be the weather. Your reactions will hinge upon your chances of being located and rescued, and these chances more often than not depend on the weather. Your spirits will tend to rise on clear days and fall with storms or low visibility.

Another factor greatly affecting morale is fear (read that ignorance). "When we see the Northern Lights, does that mean a huge storm is coming?" Questions like this coupled with no answers, or worse, incorrect answers, tend to decrease what could already be a low morale factor. Face it . . . even if the Northern Lights did mean a storm approaching, you can do little about it. If you are already well-sheltered and have taken at least the most rudimentary precautions, there's not a whole lot you are going to be able to do about it.

Useless conjecture is another enemy of morale. "What if we leave the shelter to start a smoke-signal fire and the rescuers find our shelter fire and we're not there?" The "What If" syndrome is useful only in positive planning, not in negative actions. Don't lose a chance to be rescued because of negative "What Ifs."

Apprehension and pessimism are usually most pronounced in injured people. These feelings can often be contagious, particularly as the length of time you are stranded grows longer. If you can improve the physical condition or the spirits of injured persons, the group's spirits will improve.

Possibly the best way to boost morale, or keep it high, is to take positive measures relative to rescue. Building smoke fires, tramping out "help" signals in the snow, trapping animals, making an injured person more comfortable . . . all these can help morale.

Prayer often has a beneficial effect, as can some of what we would normally consider "little things." The hissing of a small stove often provides more comfort than the meager heat it provides . . . the manufacture of a toothbrush from a pine bough . . . the noise of an aircraft indicating that a search effort is being made . . . any of these things can turn the tide of depression.

You Made It. Survival in a nasty situation can often be boiled down to the fact that one or more members of the party managed to keep their wits about them all during the ordeal. If you are in a situation where your family is with you, you can suffer because you are inflicting this "terrible thing" on them, *or* you can take heart that they are along to help you out and work with you though a time of trouble . . . it's up to you.

The old adage, "You'll look back on all this and laugh," is often truer than many of us will admit. If you use your head, prepare properly, and have a good attitude, you'll get along OK . . . it won't be like an R&R, but it will be bearable. And just think of the "war stories" you'll be able to tell when you get back to the shop!

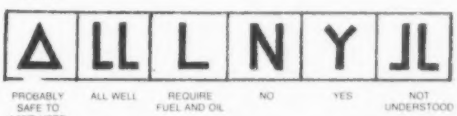
(near right)
If your car happens to wind up upside down, it can still be an adequate shelter. Pine boughs can insulate the floor (which used to be the roof) and make it a cozy little place. You should be sure, however, that the entire weight of the car is not resting on the roof structure. If it is, brace it well with logs before you use it for a shelter.

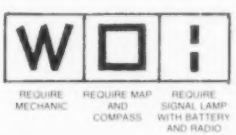
(far right)
If you're stranded with the family, allow the children their fun and games, but try to channel their energies into a constructive vein. Building a lean-to or other type of shelter will keep them busy and may provide you with an "out" should your present shelter prove unsuitable.

(right)
If you absolutely can't stay with the car, make a shelter out of whatever is handy . . . the car's interior panels and wiring can be useful, as can a "space blanket" or large piece of fabric. Use more fabric or pine boughs to keep yourself off the snow.

(below)
While this aerial view shows parachutes, we use it to illustrate how well a straight, dark-colored line shows up against white terrain. Make these signals out of clean tree branches, rocks, fabric, anything that contrasts with the snow.

GROUND/AIR VISUAL CODE FOR USE BY SURVIVORS





IF IN DOUBT, USE INTERNATIONAL SYMBOL

SOS

Make a copy of this chart and paste it inside your trunk or survival kit. These symbols do not show up in nature and are highly conspicuous to airborne searchers. Signals should be displayed in a clearing and be as large as possible. Even if you just stamp them out by walking the area, they are visible at quite a distance.

Timely Topics

Studded Tires

Although most experts recommend use of conventional snow tires plus removable, reinforced tire chains for icy conditions, studded tires are still popular with many motorists. If you use studded tires in winter, you should review this list of state laws (current as of September 1977). Most states make no distinction between residents and non-residents. If studded tires are legal in your home state, you might cross the state line and find yourself in violation without realizing it.

Contributing to the confusion about studded tire laws is the recent introduction of so-called soft studs, which reportedly are far less damaging than conventional ones.

The following list was compiled by the AAA national headquarters. Dates in parenthesis refer to the time period during which studs may be used. They may not be used before or after those dates.

UNITED STATES

Alabama — no restrictions
Alaska — (Sept. 15-May 1)
Arizona — (Oct. 1-May 1)
Arkansas — (Nov. 1-April 30)
* California — (Oct. 1-May 1)
Colorado — no restrictions
* Connecticut — (Oct. 15-April 30)
Delaware — (Oct. 15-April 15)
District of Columbia — (Oct. 15-April 15)
+ Florida — Prohibits metal-studded tires
Georgia — no restrictions
+ Hawaii — prohibited
Idaho — (Oct. 1-April 15)
+ Illinois — completely banned
Indiana — (Oct. 1-April 30)
Iowa — (Nov. 1-April 1)
Kansas — (Nov. 1-April 15)
Kentucky — no restrictions
+ Louisiana — outright ban
Maine — (Oct. 2-April 30)
Maryland — (Oct. 15-April 15)
Massachusetts — (Nov. 2-April 30)
+ Michigan — state-approved "soft studs" only (Nov. 14-April 1); Northern regions (Oct. 1-May 1)
+ Minnesota — banned, except out-of-state vehicles may use for 30 days
+ Mississippi — total ban
Missouri — (Nov. 1-April 1)
Montana — (Oct. 1-May 31)
Nebraska — (Oct. 1-April 15)
Nevada — (Sept. 1-April 30)
New Hampshire — no restrictions
New Jersey — (Nov. 15-April 1)
New Mexico — no set time limits but permitted "only when required for safety because of . . . conditions tending to cause a vehicle to skid."
New York — (Oct. 16-April 30)
North Carolina — no restrictions
North Dakota — (Oct. 15-April 15)
Ohio — (Nov. 1-April 15)
Oklahoma — (Nov. 1-April 1)
Oregon — (Nov. 1-April 30)
* Pennsylvania — (Nov. 1-April 30)
* Rhode Island — (Oct. 31-April 1)
South Carolina — no restrictions
South Dakota — no restrictions
Tennessee — no restrictions
+ Texas — prohibits metal-studded tires
+ Utah—tungsten carbide studs only; (Oct. 15-March 31)
Vermont — no restrictions
Virginia — (Oct. 15-April 15)
Washington — (Nov. 1-April 1)
West Virginia — (Nov. 1-April 1)
+ Wisconsin — total van
Wyoming — no restrictions

CANADA

Alberta — no restrictions
British Columbia — (Oct. 1-April 30)
Manitoba — (Oct. 1-April 30)
New Brunswick (Oct. 15-April 15)
Newfoundland — (Nov. 1-April 30)
Nova Scotia — (Oct. 15-April 15)
+ Ontario — total van
Prince Edward Island — (Oct. 1-May 31)
Quebec — (Oct. 15-May 1)
Saskatchewan — no restrictions

+ Indicates jurisdictions prohibiting conventional metal-studded tires.
* Will be banned after 1978.
# Subject to change at discretion of State Highway Commission.

Care Advised In Minicars

For a wide variety of reasons, ranging from the energy crunch to simple economy, many people will have their first experiences with small cars in the next few years.

As creatures of habit, they may continue to do things that were acceptable in larger vehicles, but downright dangerous in mini cars. One is overloading the car with passengers and paraphernalia.

Four adults in a car can approach 800 pounds of instant loading. Add vacation luggage in the trunk and on the roof and the load rises to 1100 pounds. A full tank of gas is adding another 100 or so pounds.

This can total more than half the weight of the car and the handling might not be markedly different. But the suspension systems of smaller cars, while generally excellent, are not designed for that kind of abuse.

Metric Speed Limits

In the Sep '77 DRIVER "Timely Topics" we said that next year speed signs on the nation's roads will be converted to the metric system . . . "

Two weeks after the September issue went to press we received word that there will NOT be a conversion to the metric system on speed signs in the near future. Money appears to be the reason. The conversion of signs nation-wide would be very costly.

Fill Out Tire Registration Form

If a tire dealer asks you to fill out a registration form the next time you buy a tire, complete it for your own benefit.

The dealer may present a form to the purchaser and ask him to fill in the required information before he takes possession of the tire, according to a recent interpretation of regulations by the National Highway Traffic Safety Administration.

"It would behoove consumers to complete the form," says the Tire Industry Safety Council. "Then if a recall occurs the manufacturer can quickly notify the purchaser."

The required information on the registration form includes the name and address of the purchaser, the identification number of the tire, the name and address of the seller, the name and address of the manufacturer or his designee for record keeping.

Under the regulations, the tire seller can fill out the form himself or he can ask the buyer to do it.

If the seller asks you to fill out the registration form, he should supply you with all the information you need in addition to your own name and address. Be sure to get the tire identification number which is essential to any recall.

After the form is filled out by the purchaser or the dealer, it is the dealer's responsibility under the law to send the completed form back to the tire manufacturer or his designee.

All passenger car tires made after 22 May 1971 are required by federal law to have a special identification number.

A typical number might appear on the sidewall as follows: DOT WZL9 ABC267. "DOT" means the tire meets or exceeds U.S. Department of Transportation safety standards. "WZ" is the code number assigned by DOT to the manufacturing plant. "L9" is the tire size. In this case, L9 is the designation for a G78-14 tire. "ABC" is a group of up to four symbols, optional with the manufacturer, to identify the brand or other significant characteristics of the tire. "267" means the tire was made during the 26th week of 1977.

Snowmobile Safety Improving

According to statistics issued by the National Safety Council, snowmobile-related deaths dropped 19 per cent last winter, despite a record increase in the number of the sport's participants.

Industry spokesmen attribute the decrease in deaths to better driver education as well as to better and safer machines, but they indicate that the proliferation of regular snowmobile trails may be a large contributor, too.

One thing about the report was extremely distressing though: One-third of the fatal snowmobile accidents involved collisions between snowmobiles and motor vehicles.

Hey, everybody . . . snowmobiles are supposed to be off-road vehicles, so if you operators will stop taking them on streets and roads, you'll cut snowmobile-related deaths by over 30%. Think about it.

Long Hair and Jewelry

In the Aug '77 "Backyard Mechanic," we showed a young lady changing the oil and doing a lubrication job on her car. In the captions, we cautioned readers about long hair and personal jewelry and the hazards they can present in such a situation, but our photos did not make that message clear. So, if you are going to do any work at all, be it on the job or involved with a hobby, be sure to use all available personal protective equipment, secure or remove jewelry, and loose or floppy clothing, and wear something suitable for the job you're going to do.

Motorcycle Study

In the July issue of *Traffic Safety* Magazine, Mr. Robert Parenti of the Utah Highway Safety Division has turned the spotlight on an on-going motorcycle study that may have far-reaching effects on the future of helmet laws as well as giving significant insight into the causes of motorcycle accidents.

In the study, conducted by Utah's Highway Safety Division, over 220 separate motorcycle accidents were put into a statistical format and analyzed by computer. The 220 accidents mentioned were chosen because of the availability of complete information about the crashes.

The study found that *motorcycle driving experience was the most significant factor involved in a cycling accident.* It was discovered that 85 per cent of the cyclists involved in crashes had less than five years experience in driving motorcycles. Perhaps even more significant was the fact that 52 per cent of the cyclists had less than two years riding experience.

It was also found that experience on the particular motorcycle driven by the cyclist was less than one year in over 75 per cent of the crashes.

Another discovery was that cyclists may have a better overall driving record than automobile drivers. Over 76 per cent of the cyclists had never had a mishap before, over 90 per cent had never had their license suspended, and over 96 per cent had never had a DWI conviction.

Helmet Findings. Possibly the most interesting finding of the analysis concerned the relationship of safety helmets and the severity of head injury. In the analysis, the helmet was investigated solely as a protective device that might affect the degree of head injury sustained in a motorcycle crash. Through a series of analytical procedures, "statistically verifiable" conclusions were reached that demonstrate that the helmet is not *significantly* (emphasis ours, Ed.) related to the severity of head injuries." This does *not* mean that the head is going to be injured with OR without a helmet . . . it means that if you're going to get your skull crushed, a helmet may not prevent that crushing. If you wear that helmet, the changes of your head being injured are demonstrably reduced.

Most citizens of Utah feel that way too, because an official survey taken by the Safety Division shows that over 79 per cent of the cyclists wear their helmets at all times, *even though State law only dictates helmet use above 35 mph!* Another thing for the anti-helmet guys to consider is that only 20 percent of Utah's cyclists favor repeal of the above 35 mph helmet law!

Looks like both Utah's cyclists AND the Highway Safety Division have got their acts together.

GM Recalls 330,000 Pickups

General Motors is recalling 330,000 Chevrolet and GMC pickup trucks manufactured in the 1976 and '77 model years. The light-duty pickups may have a problem with the accelerator pedal that would cause the throttle to hang up in the full-open position.

Although only one minor injury has been reported to be caused by the problem, GM says there is a possibility that the accelerator pedal rod could cut through and catch in the rubber floor mat or carpeting during repeated full-throttle use. As the pedal hangs up, the throttle would not be allowed to return to the idle position.

GM is installing a new pedal and a new rod retainer to eliminate the problem.

Could this be your tool crib? If not, you may be asking for trouble. Not only is it more economical for shops to make it easy to find parts, but cribs like this don't present tripping hazards or material handling problems.

"Hey, I'm sorry you came all they way in to the garage, but there's no way we can have your car ready today. We ran into some problems. You know how it is."

Like it or not, yes, you may know how it is. But the problems of auto mechanics go beyond the delay in fixing your car. Workplaces where cars are serviced—replete with vehicles moving onto hydraulic lifts, cars jouncing in, horns squawking—bristle with safety and health hazards. These start as soon as the toolboxes are opened, and mechanics must live with them throughout the workday. The threat of a customer's ire pales in comparison to the many and varied occupational dangers encountered.

trouble in

Nasty, nasty . . . wet surfaces combined with a shop entrance from bright light into "dark city" add up to trouble. When entering, stop, sound your horn, and proceed with care.

by CAROL MORGAN

Split-rim tire and wheel assemblies kill people every year. This inflation cage at Norton AFB is the way to go.

Tools: safety hazard #1. Accidents, many of them serious, occur frequently when hand tools are manipulated incorrectly or used to perform work for which they were not intended.

The Health and Safety Guide for Auto Repair and Body Shops published by the National Institute for Occupational Safety and Health (NIOSH) lists "improper use of tools" first in its list of common hazards. Also listed are: lack of machine safeguards; tripping and falling hazards; excessive exposure to auto exhaust gases; exposure to parts cleaners, paints, and dusts; electrical hazards; and improper lifting techniques. The NIOSH Guide was prepared for and distributed to employers; and The International Association of Machinists and Aerospace Workers, finding the publication valuable, also arranged to distribute the Guide to its membership. The publication, GPO stock #1733-0048, is available for $1.40 from the Superintendent of Documents, GPO, Washington, DC 20402.

In another publication, *Loss Control: A Safety Guidebook for Trades and Services,* authors George and Helen Matwes claim that inspection of an average mechanic's tools, "always turns up a good percentage of unsafe ones—worn wrenches, mushroomed heads on hammers and chisels, split handles, etc." Badly worn hand tools are potential hazards and the cause of many accidents. Under pressure, pieces of badly mushroomed chisel heads can fly off and cause injury to the eyes, head, or other parts of the body. In one case, part of a bolt securing a sprocket to a shaft was being knocked out by a hammer and chisel, both of which belonged to the user. A piece of chisel head, badly mushroomed, flew off and blinded the man in one eye.

Along with hand tools, electric cords or plugs on motor-driven compressors should also be periodically checked and, if deteriorated or otherwise damaged, replaced.

Air hoses must be maintained in good condition. If they are not, air under pressure can escape from a hose in a startling blast, whipping the hose around the floor and threatening injury to anyone within striking distance. Some of the many cases of injury from misuse of compressed air in industrial establishments involve horseplay and other

the auto repair shop

This article first appeared in Job Safety and Health, *a publication of the Department of Labor. It was written for people whose jobs involve working on cars. If you work on your own car at the hobby shop or in your own backyard, or if you have a parttime job in a service station or parking lot, you need to know the serious safety and health hazards you encounter every day.*

Outside view of inflation cage shows worker operating valves located outside the cage. After inflation, wheel and tire are left inside the cage to "cook" for about 30 minutes, almost completely precluding chance of rim/wheel separation.

illegitimate uses of air lines and related equipment. In one case, an auto mechanic suffered a perforated bowel as the result of compressed air entering his body. The NIOSH Guide gives directions for the safe use of compressed air in auto repair and body shops.

Electric tools present additional threats to mechanics' safety. An ungrounded power tool can lead to electric shock, and death if enough current passes through the heart. If a mechanic is sweating (thereby offering little body resistance to the current), chances of being severly shocked increase. Also, hand-held electric power tools, such as an electric saw or drill, should be equipped with a "dead man" control, says NIOSH, so that the power is automatically shut off when the operator releases pressure.

Tire changing is another potentially hazardous job. A safety tire rack, cage, or equivalent protection should be provided and used when inflating, mounting, or dismounting tires installed on split rims. When truck tires are repaired, a tire cage ought to be used to entrap the rim should it fly off; a flying rim can slam into somebody, causing serious injury or even death.

The safety director of a large auto dealership in Virginia says that in his opinion the most hazardous equipment used by auto mechanics is the grinding machine. He explains, "People think that because they have a small job to

continued

continued

do, like grinding a bit off a part, they don't need a shield. Then a finger slips, or a steel chip flies into their eye. It only takes one second to do what they're supposed to do."

Grinding machines should be equipped with tool rests, and operators ought to wear face protection, to guard fingers and eyes against accidents. Safety guards must cover all abrasive wheels, says NIOSH. Unguarded grinding wheels have been known to break free at high speed—in one case, taking off a mechanic's head.

Rotating pulleys and belts on air compressors and electric motors also should be properly guarded. An auto repair shop generally is equipped with all kinds of machines, and since moving parts on any machine can create a hazard, it is essential that the right kinds of guards be provided, kept in place, and conscientiously maintained.

Slip and Fall Hazards. Closely related to hazards posed by mechanics' tools in use is the enormous risk of slips and falls in the auto repair shop. Usually a car is brought in, anchored in one spot, and not moved until work on it is finished. Gradually the car being serviced becomes an island in a sea of tools. Pieces of metal, mallets, power cords, and air lines for tools tend to create a potential disaster area around the car. Add to these stumbling blocks the commonplace oil and grease spills, and it's no wonder that slips, trips, and falls are both frequent and serious for auto mechanics. Having "a place for everything and everything in its place," isn't easy in a workplace as busy as an auto repair shop, but is a good commonsense rule to follow.

OSHA requires that appropriate trash cans and covered disposal bins for oily refuse be handy for use and emptied regularly; that spills and grease spots be promptly cleaned up; that absorbent material be used on oil and grease spills; and that other good housekeeping procedures be followed.

Health Hazard—Asbestos Exposure. Although an auto mechanic's problems may start with opening the toolbox, by no means do they end there. In number, health hazards in a typical repair shop easily rival the sometimes more obvious safety hazards.

While auto mechanics are rarely exposed to any one major health hazard in the workplace all day long, they are commonly exposed to asbestos. It is known that even intermittent exposure to quantities of asbestos fiber or dust can lead to asbestosis and asbestos cancer, which may surface only decades after such exposure. Asbestos has been shown to be associated with cancer of the lungs (bronchogenic carcinoma), stomach, colon, and rectum.

Another major threat to workers exposed to asbestos is mesothelioma, a cancer of the lining of the abdomen or chest cavity. Mesotheliomas tumors are diffuse and spread rapidly. They have yet to be successfully cured by any treatments including chemotherapy, radiation, or surgery. Death usually results within a year of diagnosis. In general population, mesothelioma is so rare that it has yet to be separately coded in the international classification of diseases. Where there is no exposure to asbestos, mesothelioma may account for one death in several thousand. In some groups of asbestos workers, however, it may account for one death in ten.

The National Institute for Occupational Safety and Health estimates that, overall, more than one million U.S. workers are potentially exposed to asbestos in manufacturing and servicing brake pads, brake linings, and clutches. More than 90 percent of these workers are auto mechanics. Recent discoveries in the field of job-related disease have focused attention on asbestos hazards faced by auto mechanics performing brake pad and lining operations with the heat-resistant material.

Asbestos is a generic term used to describe a number of naturally occurring, fibrous, hydrated mineral silicates. Asbestos fibers are generally characterized by high tensile strength, flexibility, heat and chemical resistance, and favorable frictional properties. If asbestos fibers are inhaled, secretions coat them until the lungs cannot function properly, with severe disability resulting. Brake linings contain 33 percent to 73 percent asbestos.

For auto mechanics, the greatest threat of incipient asbestosis occurs in service stations where 50 percent of all brake work is performed; independent garages are next, doing 37 percent of all brake work; then new car dealerships, and finally fleet shops.

A clinical study of 104 United Auto Workers (UAW) members with more than 10 years in this line of work showed that 29 percent suffered decreased vital capacity of pulmonary function. The x-rays of more than one-fourth of the workers studied revealed abnormalities consistent with asbestosis. These findings were made known by a research team from the Mt. Sinai Environmental Sciences Laboratory in September 1974 at the 18th International Congress on Occupational Health in Brighton, England.

Prior to the presentation in England, the UAW had incorporated the Mount Sinai research team's findings into a bulletin. Posted in UAW members' repair shops, the bulletin lists a seven-step procedure for safe brake work. It urges that a respirator or mask be worn throughout the process and warns further:

"Under no circumstances should the brake drum be banged on the floor to release the dust, or dust be blown in the shop air."

Publication and posting of the warnings don't guarantee employee cooperation. One prominent union official, a former mechanic, says, "I wish I had a dollar for every time I blew dust out of brake linings with an air hose. It's a common practice."

Many industrial hygienists agree that existing safety measures protecting against asbestos exposure during brake lining should be intensified. Adequate engineering controls should be adopted.

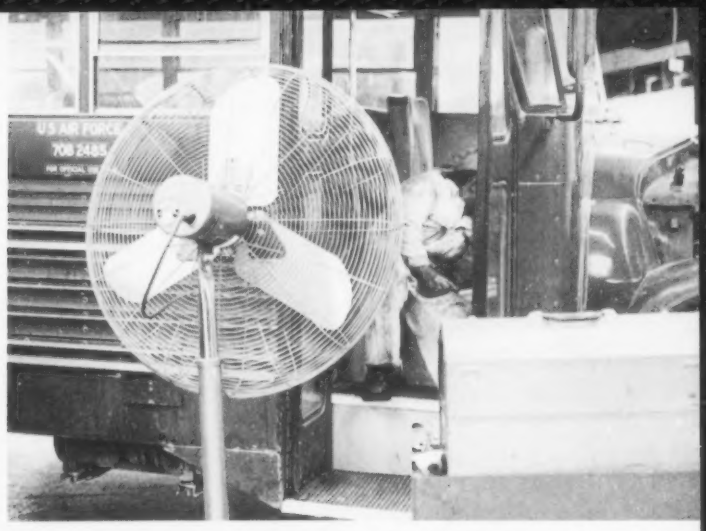
Management policy and personal protective equipment also play their part. To lower asbestos levels in his shop, the safety director of one large dealership instructs mechanics to replace brake shoes rather than regrind them. A respirator should be worn during any asbestos-related operation.

Furthermore, several studies suggest that, at levels below those known to induce asbestosis, asbestos acts as a lung carcinogen—particularly in persons who smoke. A cigarette smoker exposed to asbestos has a 92 times greater chance of dying of lung cancer than a person who neither works around asbestos nor smokes cigarettes. Certain study results suggest that the combination of cigarette smoking and exposure to asbestos dust in the workplace air constitutes a more severe health hazard than inhaling asbestos dust alone.

Two years ago OSHA proposed reducing the permissible level of asbestos exposure from 5 fibers to 0.5 fibers of the substance per cubic centimeter of air. Although the standard was lowered to 2 fibers in July 1976, many doctors believe there is no safe permissible level.

The Hazard of Lead Absorption. Another major health hazard, lead absorption, may be decreasing in severity as a threat to mechanics because of tech-

Tire bead breaker shows how moving parts can be painted to contrast with fixed parts thereby minimizing danger to operator's hands and feet. Also notice location of controls . . . operator must have both hands behind guard to cycle machine.



Even in well-ventilated shops, carbon monoxide can accumulate at floor level. Fan keeps air circulating around worker operating in confined area. Fan guard is AF and OSHA requirement.

nological advances at auto repair job sites. Serious health effects of lead absorption include damage to the central nervous system, headaches, abdominal pain, anemia, kidney ailments, impairment of leg and arm functions (such as "wrist drop," a condition preventing mechanics from holding their hands up), and seizures.

Engine exhaust gases pose a lead hazard. However, exhaust gases that would be great enough to produce chronic lead poisoning would first cause acute, perhaps even fatal, carbon monixide poisoning. But auto mechanics who wash parts in leaded gasoline do subject themselves to the cumulative effects of leadtetraethyl and leadtetramethyl. Gasoline containing leadtetraethyl is being phased out, however, so this particular hazard is decreasing.

Routes of lead absorption for auto mechanics are inhalation, ingestion, and skin absorption of leaded gas. Using lead for dent-filling operations in body shops can be hazardous. Fumes can be inhaled and small lead particles ingested. Preventive measures to be taken when using lead for dent-filling operations, as well as when working with lead-based paints and primers, include: assuring adequate ventilation; wearing appropriate MESA/NIOSH-approved respirators; and washing hands before eating and before changing from work clothes. Lead for dent-filling operations is gradually being replaced by epoxy resins and polyesters. This does not preclude the need for suitable respiratory protection.

Exhaust Gases in the Shop. Sharing the air with lead in auto repair shops are varieties of dangerous gases. Most are emitted from automobile exhaust systems. Here, modern technology has not always been on the side of auto mechanics in their struggle against occupational illness.

Used extensively for the first time on 1975 cars, the catalytic converter was developed as an antipollution device to reduce carbon monoxide emissions. Lead compounds are not emitted by catalyst-equipped vehicles because these must use lead-free gasoline to avoid engine damage. However, as Environmental Protection Agency (EPA) scientists discovered, catalyst-equipped vehicles do emit more vapors of toxic sulfuric acid and hydrogen sulfide than noncatalytic vehicles.

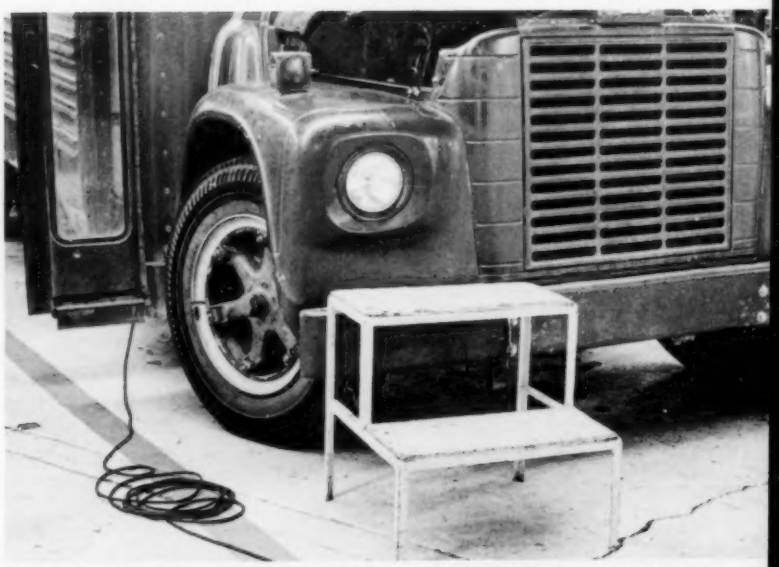
In sufficient concentration, sulfuric acid irritates the nose, throat, and lungs. Prolonged irritation by sulfuric acid vapor can cause severe lung damage. At very low concentrations hydrogen sulfide has a disagreeable odor, similar to rotten eggs. However, at concentrations much higher than the threshold of odor detectability, the gas has serious effects on health. Chronic bronchitis and chemical pneumonia can also develop if the fumes from the catalytic converter are exceptionally high and there is repeated exposure.

Many auto mechanics' employers may not know that catalytic converters increase the emission of sulfuric acid vapor and particulate sulfates. "If that is the case," writes Dr. Thomas F. Mancuso, "then dealers and garages would not have known and would not have been forewarned that markedly increased ventilation and strict adherence to the rules of operation of autos and ventilation would be required for the 1975 cars with the catalytic converters."

Nitrogen dioxide from the exhaust is another threat to auto mechanics. Exposure to nitrogen dioxide may not produce discomfort until several hours after the end of exposure. But, as long as eight hours after exposure, a mechanic may become distressed by an accumulation of fluid in the lungs.

Perhaps the most familiar health hazard in garages is carbon monoxide. Auto mechanics running cars indoors can absorb high concentrations of this odorless, tasteless, deadly gas. Entering the blood through the lungs in the same manner as oxygen, carbon monoxide displaces oxygen in the hemoglobin

Vapor-proof lighting is a good idea, particularly around solvent tanks or areas where gasoline vapor can accumulate.



Work stands with non-slip surfaces can prevent back strain from reaching high over fenders and alleviate the old "fall off the fender" accident.

because it has approximately 200 times greater affinity for hemoglobin than does oxygen. As a result, the hemoglobin cannot transport oxygen, thus inducing suffocation.

Proper ventilation of exhaust gases will prevent this. It is the responsibility of the employer or supervisor to be sure that shop ventilation prevents exhaust buildup and that the exhaust from each car being serviced can be ventilated directly to outside the building. Shop supervisors should take every precaution to make sure the staff uses the individual vent systems correctly and consistently.

Other common Health Hazards. While asbestos, lead, and exhaust gases constitute the most serious occupational health hazards confronting auto mechanics, many other health problems are parked in repair shops. Though usually not deadly, these other hazards can be irritating and painful. Among the most pervasive are the following:

■ *Parts cleaners*—Excessive exposure to some solvents can cause skin problems, plus a range of other problems for the mechanic. Washing auto parts by swishing them around in a bucket of gasoline (a practice for which mechanics are notorious) can result in dermatitis and lead poisoning. Trichloroethylene, a degreaser infrequently used by mechanics to wash parts, in addition to causing dermatitis, can produce a narcotic effect similar to drunkenness. It can also cause headaches and, far more serious, it can damage the liver and kidneys.

Rubber gloves and aprons may be used to avoid skin contact with cleaning irritants. In some instances a face shield might also be necessary for further protection from splattered solvents. If a mechanic works over these materials for extended periods, a respirator might prove helpful.

■ *Lifting and carrying*—The NIOSH Guide explains and illustrates factors that contribute to proper lifting. These include consideration of the weight, size, and shape of packages, as well as tips on correct teamwork lifting and carrying.

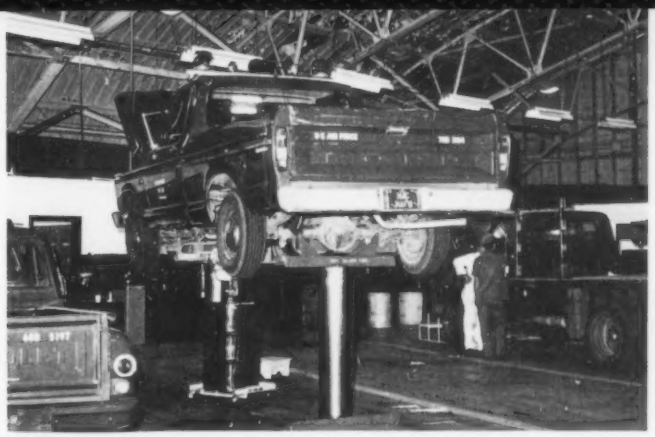
■ *Noise*—As anyone who has visited an auto shop knows, noise can be a problem. The loudest noises arise from the use of pneumatic chisels and hammers against sheet metal. Noise produced by pneumatic drills often exceeds 90 decibels, although this exposure generally lasts only a short time. Ear protection, such as ear plugs or ear muffs, may be necessary as a temporary protective measure until effective engineering controls for noise are implemented.

OSHA's current standard on occupational noise exposure imposes a limit of 90 decibels for eight hours duration per day. The maximum permissible sound level is 115 decibels for no more than 15 minutes duration per day.

■ *Tool vibration*—Vibrating tools, including buffers, grinders, and small hand tools (such as those used to remove nuts from a car wheel) should not be used for prolonged periods. These tools, vibrating in the lower frequencies at up to 20 cycles per second, can cause a numbing of the hands called white fingers or Reynaud's Phenomenon.

■ *Welding fumes and flash*—The "stick" used in the electric welding process to provide arcing can produce the gas ozone, which can irritate the lungs, eyes, nose, and throat. The welding process can also expose the mechanic to nitrogen dioxide. Additionally, if chlorinated degreasing solvent vapors

Area around brake grinding apparatus is clean, well lighted. Ventilation needs to be improved, perhaps, by addition of localized air suction system.



(above)
Formula for trouble . . . truck on lift combined with dark work area equals many potential problems.

(right)
Clean, well-lit, organized . . . the epitome of a good shop. Personnel training programs, work habits and procedures, and proper work attitudes can go a long way toward making your shop a safe place to work.

contact the arc made in welding, the highly toxic gas phosgene can be produced. Adequate ventilation and the use of respirators safeguard against this. Mechanics should also wear the proper dark goggles while welding to protect their eyes against the flash, which can lead to eye burn.

Responses to the Problem. Health and safety hazards to auto mechanics are being challenged by the unions, the federal government, insurance companies, the industry, and workers themselves.

OSHA has proposed changing the standards for asbestos and lead, and is considering changing the standard for carbon monoxide. The standards for sulfuric acid and noise are being rewritten, with stricter requirements for medical testing. A proposed standard for work in confined spaces, applicable to shop conditions, is now being developed.

Auto repair and body shops deal with safety and health problems in various ways. Some shop managers refuse to face their problems squarely, regarding job-related illness or injury as "one of those things that will always happen." Some shops point out various measures in use, such as innovative ventilation systems. Others establish safety-and-health-conscious routines and attitudes among the mechanics and provide adequate protective equipment and ventilation.

One large dealership in the Washington, DC area serves as an example of this last type of shop. There, the safety director heads a plant safety committee composed of representatives from each department, who meet monthly to report on plant safety. Representatives of insurance companies also attend, and make monthly inspections. Further, the safety director conducts inspections weekly, and gives safety training for the new mechanics. Accidents are reported immediately and an accident record is posted in several places throughout the shop. The OSHA poster is conspicuously displayed.

Recently, this dealer paid for a special inspection by an insurance company, which found, among other things, that the electric fans needed proper guarding. The matter has been attended to. In addition, the dealer is planning an exhaust system for drawing out carbon monoxide through vents in the ceiling. Although there is an exhaust system already in the floor, the second system will trap the gas as it rises.

Perhaps what is most needed in auto repair shops is conscientious training for both shop managers and mechanics on the nature, cause, and prevention of worksite injury and illness.

The General Motors School of Product Services requires safety training as a preliminary to its automotive courses. In 1975, the school's 30 nationwide facilities trained 367,610 persons in all aspects of automotive work. The average student spends nine months in training as an auto specialist.

The crusade for improvement has gotten attention in the press. The *Private Carrier,* a monthly publication of the Atlantic Richfield Company, urged in its February 1975 issue that a "comprehensive safety program" be followed in truck repair shops, the regimen to include personal cleanliness, workplace housekeeping, and OSHA-type inspections meant to insure compliance with the federal law.

All too often, information about health and safety is learned only through experience—sometimes sad experience. But once mechanics and managers know more about the hazards of the jobs and learn to be properly concerned, the auto repair shop will become a better place to work.

double clutch

continued from page 2

grounds that cars will soon be so complicated nobody will be able to do their own maintenance without 18 months of training and a $20,000 tool kit.

Well, we thought, all he needs is a vacation from looking under the hoods of gas guzzlers that have to meet the California smog laws. But today's *Automotive News* carries a story that makes us think he may be right about the decline of do-it-yourself maintenance. *Automotive News* reports that the Environmental Protection Agency (EPA) has officially announced its intention to require nearly-tune-up-free cars by the 1980 model year. The action comes in the form of a proposed rule that would permit the agency to test automobiles for emission purposes with the engine adjusted to any setting within the adjustability range of its carburetor, fuel injector and ignition system.

Considering the penalty for failing to meet the applicable emission standard, it is likely that the makers will have no choice but to fix carburetor and ignition settings when the car leaves the assembly line, or at least limit adjustability to such an extent that it would be a futile exercise to try to tune the car any better. By 1980 then, a tune-up may consist of little more than changing the plugs and air filter. Generally speaking, adjustability stops will be such that they cannot be defeated through the use of simple tools.

(Limited adjustability actually has been creeping slowly into the automotive field ever since clean air legislation was enacted. Electronic ignitions that need be set only initially; fuel injection systems; computer control of air injection, EGR and carburetion, such as the Volvo Lambda-Sond system, etc.)

The push for EPA's "tune-free" action comes from the fact that about 65% of all 1975 models now fail to meet the emission standards.

Meanwhile, the Tech Editor has gone off to the NCO Academy for some things military. But never fear, he'll be back. The Backyard Mechanic isn't giving up yet!

BACKFIRE

LETTERS TO THE EDITOR

APOLOGIES—WE GOOFED

Even minor flaws cannot detract from the overall excellence of DRIVER Magazine. It is obvious that your staff consists of professionals.

However, we at March AFB would like to have seen a photo credit given for the page 15, Aug '77 DRIVER production by our local base photographer, Sgt Dana Spring. Sgt Spring has created some outstanding photography for our base newspaper here, including his motorcycle depiction used by DRIVER.

Lt Col L. A. McLean, USAF
22d Bomb Wg/IO
March AFB, CA 92518

Please accept our apologies, Sgt Spring, for the oversight of a credit line for your fantastic photography.

"DRIVING EMERGENCY VEHICLES"

It's a real pleasure to see articles such as "Driving Emergency Vehicles" in your Jul '77 DRIVER. This article, and similar articles in DRIVER, show the true benefits of training emergency vehicle operators.

However, it is a crying shame that the programs in use at March and Lackland AFB are the exception and not the rule for most ambulance drivers at DOD installations. Even after extensive efforts to upgrade emergency medical services at DOD installations, many ambulance drivers are still 18 years old and fresh out of medic school with, at the most, two years of driving experience. There have been many instances where a young E-3 has gotten his military driver's license (his first driver's license of any kind) and gone to work at a medical facility ambulance section the next day.

The end result of such a situation is, at the least, a fleet of battered ambulances. I have personally taken trips to many uniformed services hospitals and seen government ambulances used every day that look in worse shape than most of the M60 battle tanks in service today. And with the cost of new ambulances vs. the expected life of an ambulance before replacement by the military, this is not such a small investment to protect.

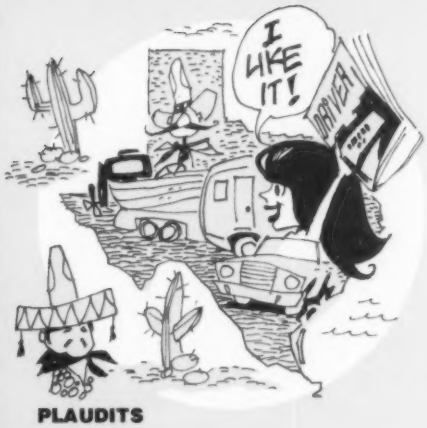
This is not to mention the liability each DOD military and civilian ambulance driver has to safely deliver patients and crew members to their destination. As a civilian EMT-driver for the last four years, I have seen discrepancies occur at this installation, and heard of many ambulance "horror stories" from other installations.

The ideal solution is to require all DOD emergency vehicle operators, both military and civilian, to be certified emergency medical technicians so they acquire good patient handling techniques, and some sort of formal emergency vehicle operator's training, so they learn techniques of delivering those patients to the hospital safely. All of this should be done before this individual even touches a government ambulance.

While this type of training would take a lot of planning to be implemented in a uniform way for all the services, the military had better be thinking about following the national trend in educating emergency vehicle drivers. After all, there is a lot at stake every time an ambulance takes to the road.

Mr. Michael P. Cain, EMT, USA
Ambulance Section
U.S. Kirk Army Hospital
Aberdeen Proving Ground, MD 21005

DODI 1000.14 (7 Mar 75) requires special training for ambulance drivers, school bus drivers, etc., but apparently such training is not yet widely available.



PLAUDITS

Your imaginative and unique approach to driver safety news is a pleasure to receive and read here at Corpus Christi Army Depot (CCAD), Texas.

Your Jul '77 article on trailer and cargo hauling, "Getting It There," had a lot of meaning during our recent hurricane warning (Anita) for the Texas Gulf Coast.

As a former employee of USAF and Norton AFB, let me just say that I personally read your magazine each month, and dash up the stairs to our CCAD Safety Office to get a copy before it drags through the office via "buck slip."

Keep up the good work – you're making us all more safety conscious, in an area where bad driving habits can be disastrous! High winds and water have a way of proving just how good a driver or "hauler" you really are.

Ms Bonnie J. Gibson
P.O. Box 534
Portland, TX 78374

Thank you so much, Bonnie, for the kind words.

"RADAR CAN GETCHA!"

In reference to your article in Sep '77 DRIVER, "Radar Can Getcha!," your point is well made that police radar is highly accurate and extremely difficult to argue against in court. Your principles of physics could use some brushing up, however.

In the case of police radar, the Doppler Effect results when the radar wavefront strikes a moving object and is reflected back. The difference in relative *speed* between the source of the wavefront (i.e., your car) results in a frequency shift (Doppler shift) in the reflected wavefront. The radar unit then translates the frequency shift into miles-per-hour. The larger the shift, the greater the speed. The article in DRIVER states that the Doppler Effect measures *distance* between the radar and a car, which is something the radar is not capable of doing.

Because Doppler radar measures the relative speed between the source and the reflecting object, the problem of determining an accurate speed becomes much more difficult when the police car is also moving. To get an accurate speed check in that case, the police car must first determine its own speed very accurately in order to determine the speed of the other car. Despite the difficulties involved, however, a moving radar trap can still "getcha."

1st Lt Donald L. Edwards, USAF
HQ ADCOM/KROC
Peterson AFB, CO 80914

MORE ABOUT RADAR

The article, "Radar Can Getcha!" in the Sep '77 issue of DRIVER contains two errors regarding the operation of radar.

First, the statement that " . . . a wave frequency will increase or decrease in direct proportion to the distance from the receiver" is untrue. The Doppler effect causes the echo of a continuous wave striking a moving object to have a frequency shift which is directly proportional to the rate of relative motion; it has nothing to do with the distances involved.

Second, the statement, "This sound, or frequency of sound, tells your speed both coming or going" is also untrue, since it refers to the echo frequency. It is the difference between the echo frequency and the "at rest" frequency that provides the speed information.

Readers interested in the Doppler effect may consult T.O. 31-1-141-9, paragraph 4-104 for more information and formulae.

Potential speeders should be warned that the traffic radars can clock them "going away" with the same precision and range as in the conventional "approaching" setup; a police officer may park on the far side of a bridge or billboard, and clock the passing cars from the rear. It is obvious that such a setup is invisible until too late, and it cannot be detected by any device.

One limitation of police traffic radars was not pointed out: cosine error. If a traffic radar unit is not exactly in line with the path of the traffic to be clocked, the radar-measured speed will be less than the actual speed by an amount which is related to the cosine of the angle between the traffic path and the radar path. This error increases rapidly as the radar unit is moved away from the roadway, but is only one mile-per-hour or so in short range radar setups; the error is *always* in favor of the motorist.

TSgt Eric G. Lemmon, USAF
10 AERODS/CCQTE
Vandenberg AFB, CA 93437

Our article was intended to explain the use of radar as a traffic control device, rather than how radar works. Obviously, the Doppler Effect was over our heads. Thanks to all who wrote trying to clear us up!

Address your letters to:
Editor
DRIVER Magazine
AFISC/SEDD
Norton AFB CA 92409

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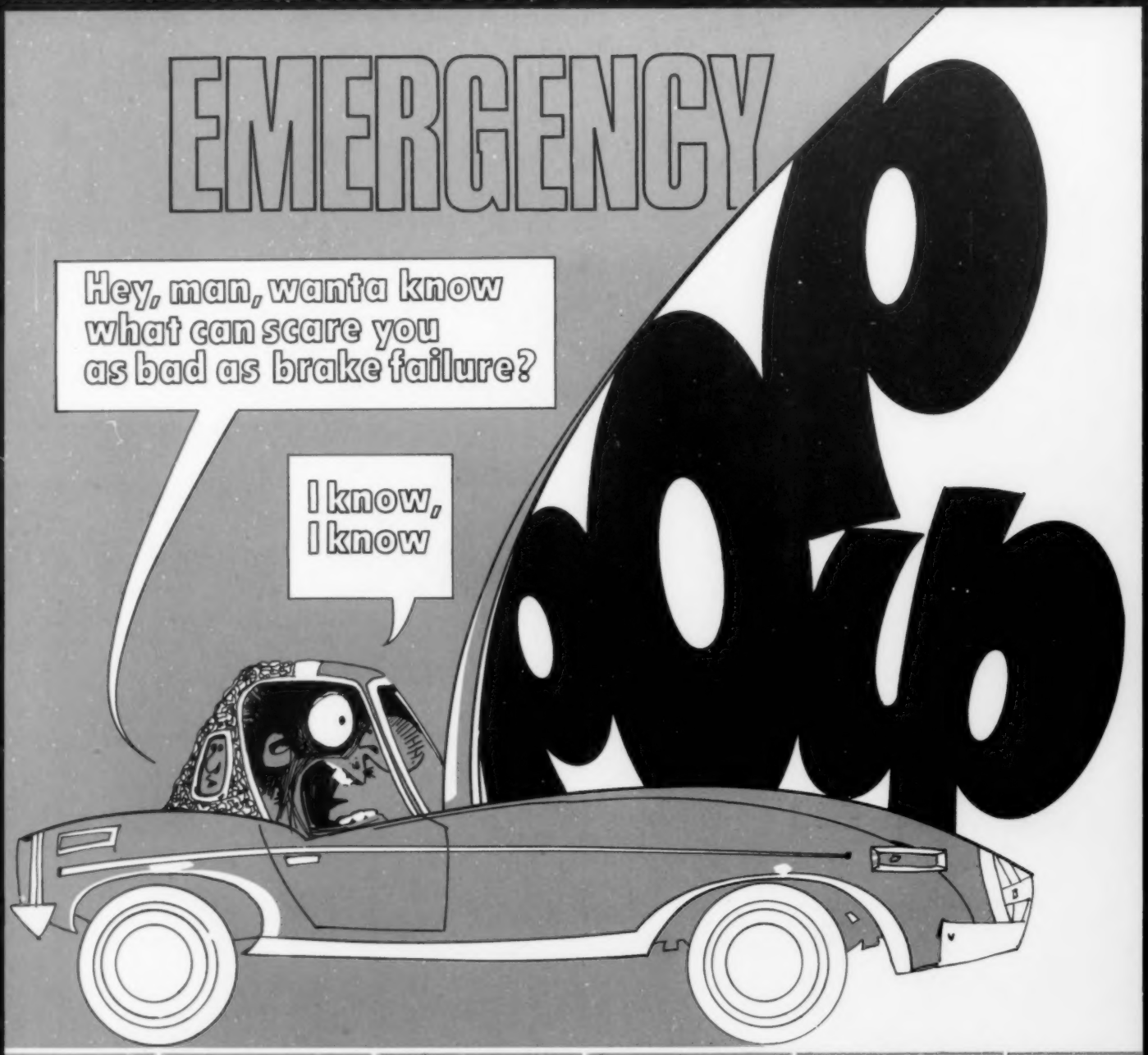
EMERGENCY



Failure of a hood latch (both primary and secondary), or improper closure of the hood and subsequent failure of the secondary latch, can result in the hood popping up while you are driving. When the hood opens in this fashion, it will block your view of the road in front of you, to say nothing of scaring you out of your wits!

This problem is not so prevalent as it was a few years ago, but it does happen. Since 1969, a federal standard has required all front-opening hoods to be provided with a second latch position on the latch system or with a second system. But these can fail, so you should know what to do if your hood suddenly pops open while you're on the road.

DON'T PANIC AND DON'T PANIC STOP. If you apply your brakes suddenly and hard, you invite a rear-end collision. Instead, ease the car to the right or left (depending on the lane you're in and the room you have on either side). Open your window and stick your head out. Watch your rear-view mirror to see how much room you have behind you. Apply your brakes slowly.

Turn on your emergency flashers and give a HAND SIGNAL to indicate you are going to STOP. DON'T LEAVE THE CAR until you are off the road.

A frequent cause of hood popup is failure to close the hood properly after checking the oil, radiator or battery. You should get accustomed to the distinctive sound made by your hood when it is closed properly. If you fail to hear that familiar "thunk," check the latch again.